What is claimed is:

1. A method for forming a trench in a semiconductor device comprising:

forming a pad oxide film and a silicon nitride film on a semiconductor substrate;

selectively etching the silicon nitride film and the pad oxide film on a region to be formed with a trench;

implanting oxygen ions into the semiconductor substrate in the region to be formed with the trench;

forming an oxide in the semiconductor substrate by reacting the oxygen ions with the semiconductor substrate through a thermal diffusion of the oxygen ions;

forming the trench by etching the semiconductor substrate and the oxide on the region to be formed with the trench using the silicon nitride film as a mask;

forming a liner oxide film on an inner wall of the trench using a thermal diffusion process; and

forming an insulation film on the liner oxide film such that the trench is filled.

2. The method of claim 1, wherein the semiconductor substrate is a silicon wafer.

3. The method of claim 2, wherein, in selectively etching the silicon nitride film and the pad oxide film, a first photosensitive film pattern for exposing the silicon nitride film on the region to be formed with the trench is formed by applying, exposing, and developing a photosensitive film on the silicon nitride film, and then the silicon nitride film and the pad oxide film exposed are selectively etched using the first photosensitive film pattern as a mask.

4. The method of claim 3, wherein, in implanting the oxygen ions, a second photosensitive film pattern having an opening portion of a width narrower than that of an opening portion of the first photosensitive film pattern is formed on the silicon nitride film and the exposed semiconductor substrate, the opening portion of the second photosensitive film pattern having the center axis as the opening portion of the first photosensitive film pattern, the oxygen ions are implanted using the second photosensitive film pattern as a mask, and wherein the oxygen ions are implanted into the semiconductor substrate at a desired depth of the trench.

5. The method of claim 4, wherein, during thermal diffusion of the oxygen ions, the oxygen ions are thermally diffused in a nitrogen atmosphere.

6. The method of claim 5, wherein an edge at which a side and a bottom of the trench intersect has a curved surface.

7. The method of claim 1, wherein, in forming the insulation film on the liner oxide film such that the trench is filled, an oxide film is formed on an entire top surface including the silicon nitride film and the trench such that the trench is filled, and then the oxide film is chemically and mechanically polished until the silicon nitride film is exposed.

8. The method of claim 7, wherein the silicon nitride film is deposited at a thickness of 1,000 – 3,000 Å.